

CLAIMS

What is claimed is:

1. A method applicable within a mobile communication system for
2 adaptively allocating a downlink data rate to an access terminal to compensate for
3 channel fading, said method comprising:

4 selecting a downlink data rate in accordance with a determined signal-to-
5 noise level, wherein said downlink data rate is associated with a specified signal-
6 to-noise threshold to achieve a specified packet error rate;

7 transmitting a packet to an access terminal at said selected downlink data
8 rate; and

9 responsive to successfully decoding said packet, decreasing the signal-to-
10 noise threshold specified for said selected downlink data rate.

1. The method of claim 1, wherein said determined signal-to-noise level at
2 said access terminal is a ratio of the signal strength of an allocated access terminal
3 channel to the combined external signal strength.

1. The method of claim 1, wherein said selecting a downlink data rate is
2 preceded by determining a signal-to-noise level at said access terminal.

1. The method of claim 1, wherein said selecting a downlink data rate further
2 comprises:

3 comparing said determined signal-to-noise level with a plurality of signal-
4 to-noise threshold values, wherein each of said plurality of signal-to-noise
5 threshold values is associated with a downlink data rate; and

6 selecting a highest downlink data rate corresponding to one of said
7 plurality of signal-to-noise threshold values that does not exceed said determined
8 signal-to-noise level.

1 5. The method of claim 4, wherein said mobile communication system
2 includes selectable data rate control sets in which each of said plurality of signal-
3 to-noise threshold values is associated with a corresponding downlink data rate for
4 said specified packet error rate, and wherein two or more of said plurality of
5 signal-to-noise threshold values that do not exceed said determined signal-to-noise
6 level are associated with said highest downlink data rate, said method further
7 comprising:

8 comparing the relative values of said two or more signal-to-noise threshold
9 values; and

10 selecting a data rate control set corresponding to the lowest among said
11 two or more signal-to-noise threshold values.

1 6. The method of claim 1, further comprising:

2 responsive to unsuccessfully decoding said packet, increasing the signal-
3 to-noise threshold specified for said selected downlink data rate.

1 7. The method of claim 6, wherein said increasing the signal-to-noise
2 threshold specified for said selected downlink data rate comprises:

3 computing an increased signal-to-noise threshold specified for said
4 selected downlink data rate in accordance with the relation:

$$T = T_j + \Delta_{local}$$

5 wherein T represents the increased signal-to-noise threshold associated with the
6 selected downlink data rate, T_j represents the current signal-to-noise threshold
7 value associated with the selected downlink data rate, and Δ_{local} represents a local
8 data rate control delta value.

1 8. The method of claim 7, wherein said mobile communication system
2 includes selectable data rate control sets in which each of said plurality of signal-
3 to-noise threshold values is associated with a corresponding downlink data rate for
4 said specified packet error rate, said method further comprising:
5

6 responsive to unsuccessfully decoding said packet, increasing each of said
7 plurality of signal-to-noise threshold values in accordance with the relation:
8

$$T = T_i + \Delta_{global}$$

9 wherein T represents the increased value for the i^{th} signal-to-noise threshold value
10 among said plurality of signal-to-noise threshold values, T_i represents current
11 value for the i^{th} signal-to-noise threshold value among said plurality of signal-to-
noise threshold values, PER represents said specified packet error rate, and Δ_{global}
represents a global data rate control delta value.

1 9. The method of claim 1, wherein said decreasing the signal-to-noise
2 threshold specified for said selected downlink data rate comprises:
3

4 computing a decreased signal-to-noise threshold specified for said selected
downlink data rate in accordance with the relation:

$$T = T_j - (PER * \Delta_{local})$$

5 wherein T represents the decreased signal-to-noise threshold value associated with
6 the selected downlink data rate, T_i represents the current signal-to-noise threshold
7 value associated with the selected downlink data rate, PER represents said
8 specified packet error rate, and Δ_{local} represents a local data rate control delta
9 value.

1 10. The method of claim 9, wherein said mobile communication system
2 includes selectable data rate control sets in which each of said plurality of signal-
3 to-noise threshold values is associated with a corresponding downlink data rate for
4 said specified packet error rate, said method further comprising:

5 responsive to successfully decoding said packet, decreasing each of said
6 plurality of signal-to-noise threshold values in accordance with the relation:

$$T = T_i - (PER * \Delta_{global})$$

7 wherein T represents the decreased signal-to-noise threshold, T_i represents the i^{th}
8 signal-to-noise threshold value among said plurality of signal-to-noise threshold
9 values, PER represents said specified packet error rate, and Δ_{global} represents a
10 global data rate control delta value.

1 11. A mobile communication system for adaptively allocating a downlink data
2 rate to an access terminal to compensate for channel fading, said mobile
3 communication system comprising:

4 processing means for selecting a downlink data rate in accordance with a
5 determined signal-to-noise level, wherein said downlink data rate is associated
6 with a specified signal-to-noise threshold to achieve a specified packet error rate;

7 air-interface transmission means for transmitting a packet to an access
8 terminal at said selected downlink data rate; and

9 processing means responsive to successfully decoding said packet for
10 decreasing the signal-to-noise threshold specified for said selected downlink data
11 rate.

1 12. The mobile communication system of claim 11, wherein said determined
2 signal-to-noise level at said access terminal is a ratio of the signal strength of a
3 pilot channel to the combined external signal strength.

1 13. The mobile communication system of claim 11, further comprising signal
2 detection and processing means for determining a signal-to-noise level at said
3 access terminal.

1 14. The mobile communication system of claim 11, wherein said processing
2 means for selecting a downlink data rate further comprises:

3 processing means for comparing said determined signal-to-noise level with
4 a plurality of signal-to-noise threshold values, wherein each of said plurality of
5 signal-to-noise threshold values is associated with a downlink data rate; and

6 processing means for selecting a highest downlink data rate corresponding
7 to one of said plurality of signal-to-noise threshold values that does not exceed
8 said determined signal-to-noise level.

1 15. The mobile communication system of claim 14, further comprising
2 memory containing selectable data rate control sets in which each of said plurality
3 of signal-to-noise threshold values is associated with a corresponding downlink
4 data rate for said specified packet error rate, and wherein two or more of said
5 plurality of signal-to-noise threshold values that do not exceed said determined
6 signal-to-noise level are associated with said highest downlink data rate, said
7 mobile communication system further comprising:

8 processing means for comparing the relative values of said two or more
9 signal-to-noise threshold values; and

10 processing means for selecting a data rate control set corresponding to the
11 lowest among said two or more signal-to-noise threshold values.

1 16. The mobile communication system of claim 11, further comprising:

2 processing means responsive to unsuccessfully decoding said packet for
3 increasing the signal-to-noise threshold specified for said selected downlink data
4 rate.

1 17. The mobile communication system of claim 16, wherein said processing
2 means for increasing the signal-to-noise threshold specified for said selected
3 downlink data rate comprises:

4 processing means for computing an increased signal-to-noise threshold
5 specified for said selected downlink data rate in accordance with the relation:

$$T = T_j + \Delta_{local}$$

6 wherein T represents the increased signal-to-noise threshold associated with the
7 selected downlink data rate, T_j represents the current signal-to-noise threshold
8 value associated with the selected downlink data rate, and Δ_{local} represents a local
9 data rate control delta value.

1 18. The mobile communication system of claim 17, further comprising
2 memory containing selectable data rate control sets in which each of said plurality
3 of signal-to-noise threshold values is associated with a corresponding downlink

4 data rate for said specified packet error rate, said mobile communication system
5 further comprising:

6 processing means responsive to unsuccessfully decoding said packet for
7 increasing each of said plurality of signal-to-noise threshold values in accordance
8 with the relation:

$$T = T_i + \Delta_{global}$$

9 wherein T represents the increased value for the i^{th} signal-to-noise threshold value
10 among said plurality of signal-to-noise threshold values, T_i represents current
11 value for the i^{th} signal-to-noise threshold value among said plurality of signal-to-
12 noise threshold values, PER represents said specified packet error rate, and Δ_{global}
13 represents a global data rate control delta value.

1 19. The mobile communication system of claim 11, wherein said processing
2 means for decreasing the signal-to-noise threshold specified for said selected
3 downlink data rate comprises:

4 processing means for computing a decreased signal-to-noise threshold
5 specified for said selected downlink data rate in accordance with the relation:

$$T = T_j - (PER * \Delta_{local})$$

6 wherein T represents the decreased signal-to-noise threshold value associated with
7 the selected downlink data rate, T_j represents the current signal-to-noise threshold
8 value associated with the selected downlink data rate, PER represents said
9 specified packet error rate, and Δ_{local} represents a local data rate control delta
10 value.

1 20. The mobile communication system of claim 19, further comprising
2 memory for storing selectable data rate control sets in which each of said plurality

3 of signal-to-noise threshold values is associated with a corresponding downlink
4 data rate for said specified packet error rate, said mobile communication system
5 further comprising:

6 processing means responsive to successfully decoding said packet for decreasing
7 each of said plurality of signal-to-noise threshold values in accordance with the
8 relation:

$$T = T_j - (PER * \Delta_{local})$$

9 wherein T represents the decreased signal-to-noise threshold , T_i represents the ith
10 signal-to-noise threshold value among said plurality of signal-to-noise threshold
11 values, PER represents said specified packet error rate, and Δ_{global} represents a
12 global data rate control delta value.